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Attention: Contract Administrator

Reference: (a) equipment proposal CEP No. 1073 25X1
(b) quotation letter dated 28 March 1958
(c) letter dated 24 April 1958 25X1

Dear Sir:

Enclosed herewith are specifications for the design and fabrication of an antenna-filter-detector system covering the range of 50 mcs to 40,000 mcs. We will be pleased to receive a technical proposal and cost quotation on a cost plus fixed fee or fixed price basis for this requirement.

It is important that your proposal and quotation be submitted to the undersigned or his representative no later than 1 June 1959. If it is decided to place this project with your company, a new task order will be issued under the current classified task type contract.

At the time of submitting the requested proposal, or if you do not elect to submit a proposal, please return this letter and enclosures to the above address.

Very truly yours,

25X1

Enclosure:
Specifications for UHF 25X1
Antenna System

OC-E/R+D-EP/JHB:pjb (12 May 59)
Distribution:
Orig. & 1 - Addressee
1 - R+D Subject File
1 - EP Chrono

SECRET

SPECIFICATION NO. 59-A-1088-A

DEVELOPMENT SPECIFICATION

FOR

[redacted] UHF ANTENNA SYSTEM

25X1

(AN-22, AN-23, AN-24, AN-25)

20 April 1959

1. GENERAL

1.1 Purpose of this Specification. - This specification states the performance requirements of a [redacted] antenna system consisting of four antennas, twelve band-pass filters, four detectors, and four equipment boards for the mounting of ancillary equipment. The frequency coverage of the system shall be from 50 to 40,000 mc. This specification presents electrical and mechanical characteristics that will guide the development and production of prototype models of such equipment. 25X1

1.2 System Description. - The system shall consist of four antennas, twelve band-pass filters, four crystal detectors with their mounting assemblies, and four equipment boards for the mounting of ancillary equipment. Frequency coverage of the antennas shall be from 50 mc to 40,000 mc in four bands, covering 50 to 500 mc, 500 to 1000 mc, 1000 to 10,000 mc, and 10,000 to 40,000 mc. The filters shall be so designed as to separate the four above mentioned bands into sub-bands as specified in Section 3.3. The equipment boards are described in Section 3.5 of these specifications.

1.3 Nomenclature.

1.3.1 Antennas. - The following nomenclatures shall be applied to the antennas covered by these specifications. The 50 to 500 mc antenna etched from copper or aluminum-clad Mylar backed by vinyl-impregnated Fiberglass shall be designated the AN-22. The antenna covering the range of 500 to 1000 mc constructed of etched copper-clad Fiberglass laminated with teflon shall be designated the AN-23. The antenna covering the range of 1000 to 10,000 mc constructed of etched copper-clad Fiberglass laminated with teflon shall be designated the AN-24. The microwave electromagnetic horn covering the range of 10 to 40 kmc shall be designated the AN-25.

1.3.2 Filters and Detectors. - The band-pass filters shall be assigned the following nomenclatures:

Filter	Nomenclature	Filter	Nomenclature
50 to 100 mc	FI-11	2,000 to 4,000 mc	FI-17
100 to 200 mc	FI-12	4,000 to 8,000 mc	FI-18
200 to 500 mc	FI-13	8,000 to 10,000 mc	FI-19
500 to 750 mc	FI-14	10,000 to 40,000 mc	AN/A-25
750 to 1000 mc	FI-15	20,000 to 40,000 mc	AN/B-25
1000 to 2000 mc	FI-16	30,000 to 40,000 mc	AN/C-25

The detector mounting assembly to be used in the system shall be designated the MC-1.

2. QUALITY OF DESIGN AND FABRICATION

2.1 General. - The electrical and mechanical design of the antenna system shall be directed toward the development of a miniaturized quality product reflecting the highest possible degree of equipment reliability when exposed to the normally rough handling encountered during field usage.

2.2 JAN Specifications. - The contractor shall use components, materials, and fabrication procedures meeting JAN Specifications of the issue in effect on the date of initiation of the contract.

2.2.1 JAN Specification Waiver. - To accomplish the desired degrees of miniaturization, the contractor may deem it necessary to utilize other components, materials, and fabrication procedures than those meeting JAN Specifications. In such instances specific waivers may be authorized by the Government, but only after review by Government engineers and prior to the submission of any prototype models.

2.2.2 Non-Fungus Nutrient Materials. - All materials which are used in the subject antenna system are to be non-nutrient to fungi. If after determining that non-nutrient materials are not available, a waiver may be obtained as in Section 2.2.1.

2.3 Environmental Conditions. -

2.3.1 Operating Temperatures. - The design considerations of the antenna system shall be such as to preclude malfunctioning of the equipment when operated between -40°C and +60°C and stored at temperatures between -40°C and +60°C.

2.3.2 Shock and Vibration. - The equipment shall be designed to withstand the rough shock and vibration normally encountered in field operation and transportation by aircraft or motor vehicles.

2.3.3 Humidity. - The equipment shall be designed to withstand relative humidities up to 100% from -40°C to +60°C including condensation due to temperature change.

3. CIRCUITRY AND DESIGN CONSIDERATIONS

3.1 General. - The specific circuitry and design considerations to be employed in the development of the system shall be determined by the engineering ingenuity of the contractor and shall meet all mechanical and electrical operational characteristics noted.

3.2 Antenna Characteristics.

3.2.1 Antenna, Type AN-22. - This antenna shall cover the range of 50 to 500 mc and shall be constructed of copper or aluminum-clad Mylar backed by vinyl-impregnated Fiberglass. The antenna shall be of the logarithmically-periodic type and shall not exceed 45 inches in diameter. The antenna shall be constructed so that it may be operated [redacted] while attached to any convenient supporting structure such as a wall or a floor. When folded the antenna shall not exceed 6 x 3 x ½ inches in size. 25X1

3.2.2 Antenna, Type AN-23. - This antenna shall cover the frequency range of 500 to 1000 mc and shall be constructed of etched copper-clad Fiberglass laminated with teflon. The size of the antenna shall not exceed 12 x 12 inches. It shall be of the logarithmically-periodic type structure.

3.2.3 Antenna, Type AN-24. - This antenna shall be of the logarithmically periodic type and shall cover the frequency range of 1000 to 10,000 mc. It shall be constructed of etched copper-clad Fiberglass laminated with teflon. The size of this antenna shall not exceed 10 x 10 inches.

3.2.4 Antenna, Type AN-25. - This antenna shall be an electromagnetic horn covering the frequency range of 10,000 to 40,000 mc and shall not exceed 3 x 3 x 8 inches in size.

3.3 Filter Characteristics.

3.3.1 Mechanical Considerations. - The filters shall be as physically small as possible commensurate with high performance and reliability. They shall conform to shock and vibration requirements as per Section 2.3.2 of these specifications.

3.3.1.1 The filters in the range of 500 to 1000 mc shall not exceed 6 x 3 x $\frac{1}{2}$ inches in size. The filters in the range of 1000 to 2000 mc shall not exceed 3 x $1\frac{1}{2}$ x $\frac{1}{2}$ inches in size. The filters in the range of 2000 to 4000 mc shall not exceed 3 x $1\frac{1}{2}$ x $\frac{1}{4}$ inches in size. The filters in the range of 4000 to 10,000 mc shall not exceed 2 x 2 x $\frac{1}{4}$ inches in size. The filter covering the range of 10,000 to 40,000 mc will consist of a loaded portion of the waveguide in the electromagnetic horn antenna, the loading to be accomplished by the insertion of a dielectric slab in the waveguide.

3.3.2 Electrical Considerations. - One each of the following band-pass filters shall be required for each complete system as defined in Section 1.2 of these specifications:

50 to 100 mc	2,000 to 4,000 mc
100 to 200 mc	4,000 to 8,000 mc
200 to 500 mc	8,000 to 10,000 mc
500 to 750 mc	10,000 to 40,000 mc
750 to 1000 mc	20,000 to 40,000 mc
1000 to 2000 mc	30,000 to 40,000 mc

3.3.2.1 Attenuation in the pass band of the filters shall not exceed 2 db. Skirt selectivity shall provide at least 60 db attenuation at all frequencies ±15% or more from the pass band edges.

3.4 Detector Characteristics. - The detectors shall be of types such that a sensitivity of not less than -52 dbm shall be obtained over the entire operating range of the system. The detector mount shall be as mechanically strong as possible under the present state of the art and the sensitivity requirements as outlined above.

3.5 Equipment Board Characteristics. - Included with each antenna shall be one equipment board for the mounting of ancillary equipment such as amplifiers, small recorders, and other types of processing equipment which has been miniaturized. The boards shall be constructed of the same material as the antenna types AN-23 and AN-24.

ATTACHMENT "A"

DELIVERABLE ITEMS	DESCRIPTION	QUANTITY
Item 1	Complete Antenna-Filter-Detector Assembly covering the range of 50 mc to 40,000 mc and consisting of four antennas with crystal detectors and twelve filters, and equipment boards where required for the mounting of ancillary equipment	2 each
Item 2	Manufacturing Drawings, at least one set reproducible	2 each
Item 3	Operating and Maintenance manuals	6 each
Item 4	Monthly Engineering Progress Reports The contractor shall prepare and forward to the contracting agency complete and comprehensive monthly progress reports outlining all experiments and the results thereof, and including diagrams, curves, and sketches as required for clarity.	5 each (monthly)
Item 5	Final Engineering Report The final engineering report shall present a comprehensive engineering analysis of the complete antenna-filter-detector system and shall also include the final test data. It shall not refer to material in the Monthly Progress Reports but shall stand as an independent unit in itself.	5 each

3.5.1 Mechanical Characteristics.

3.5.1.1 Attachment B, consisting of five drawings, serves to specify the mechanical characteristics of the equipments boards. The equipment area must be 6 x 9 inches minimum in size while the overall size of the board is to be dictated by the size requirements of the band-pass filters and the crystal holders. The overall size of the boards is to be as small as possible commensurate with good electrical performance and mechanical stability.

3.5.1.2 The equipment board of Figure 1 is to be used with the AN-22 antenna and is not a part of the antenna structure itself. The equipment boards of Figures 2 and 3 are to be considered as part of the antenna structure itself and should consist of an extension of the material from which the antenna is made. The equipment board of Figure 4 holds not only the additional equipment but the horn antenna itself. Figure 5 is a drawing of the configuration of holes which are to be placed in the 6 x 9 inch equipment area of Figures 1 through 4.

3.6 Connectors. - Connectors used throughout the system shall be a type compatible with the IFC type MB receptacle. It is desireable that the antenna terminate in a cable with an MB connector on one end for connection to the band-pass filters. The output of the band-pass filters shall consist of a cable terminated with a type MB connector which connects to the detector. The detector output shall terminate in a type MB receptacle so that a cable may be connected between the detector output and the equipment on the equipment boards.

3.7 Other Considerations. - The results of a published investigation into the feasability of constructing an antenna system as described above will be made available as a guide for the design and construction of the system as described in this specification.

EQUIPMENT BOARD
50 TO 500 MCS.

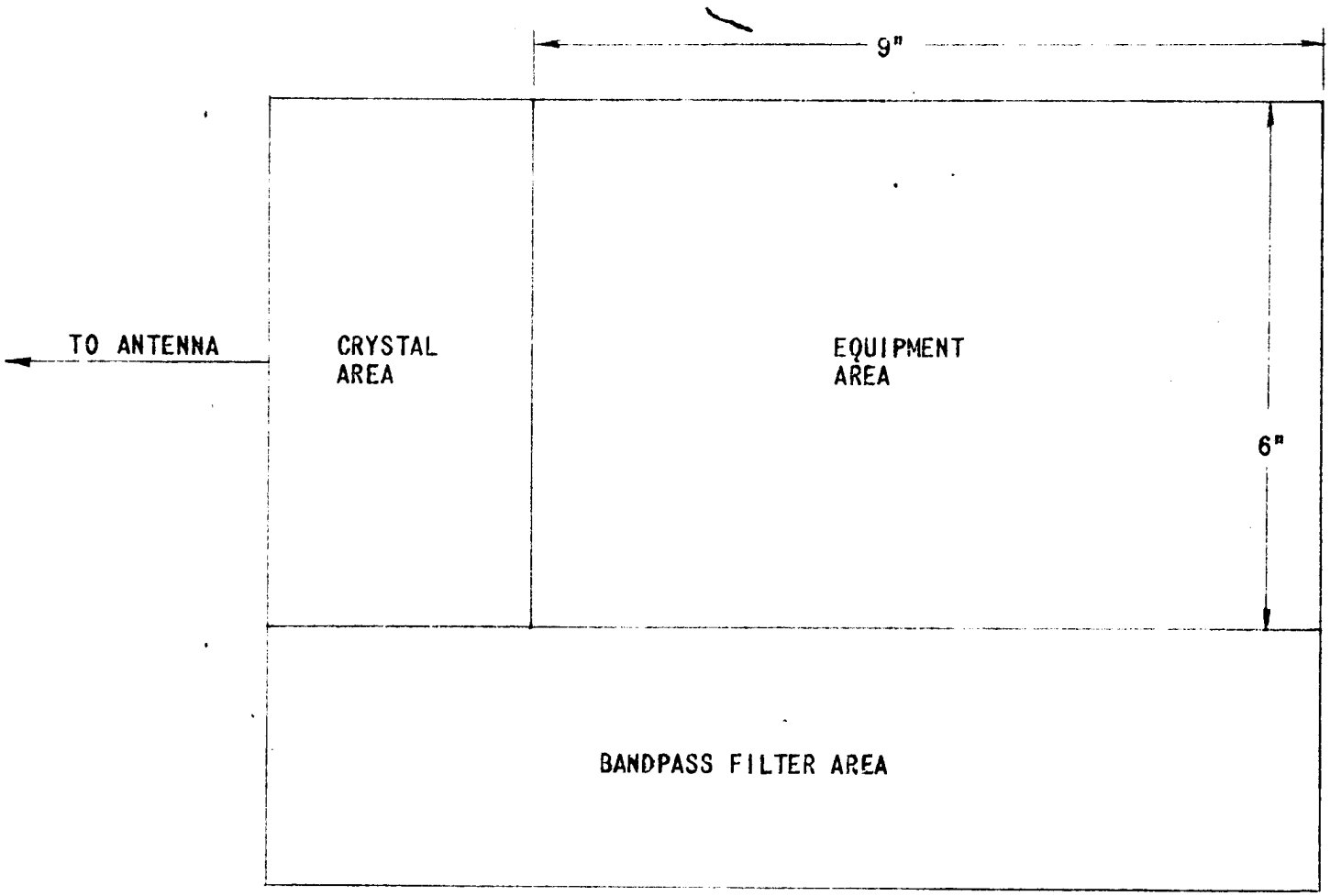

FIGURE 1

EQUIPMENT BOARD
500 TO 1000 MCS.

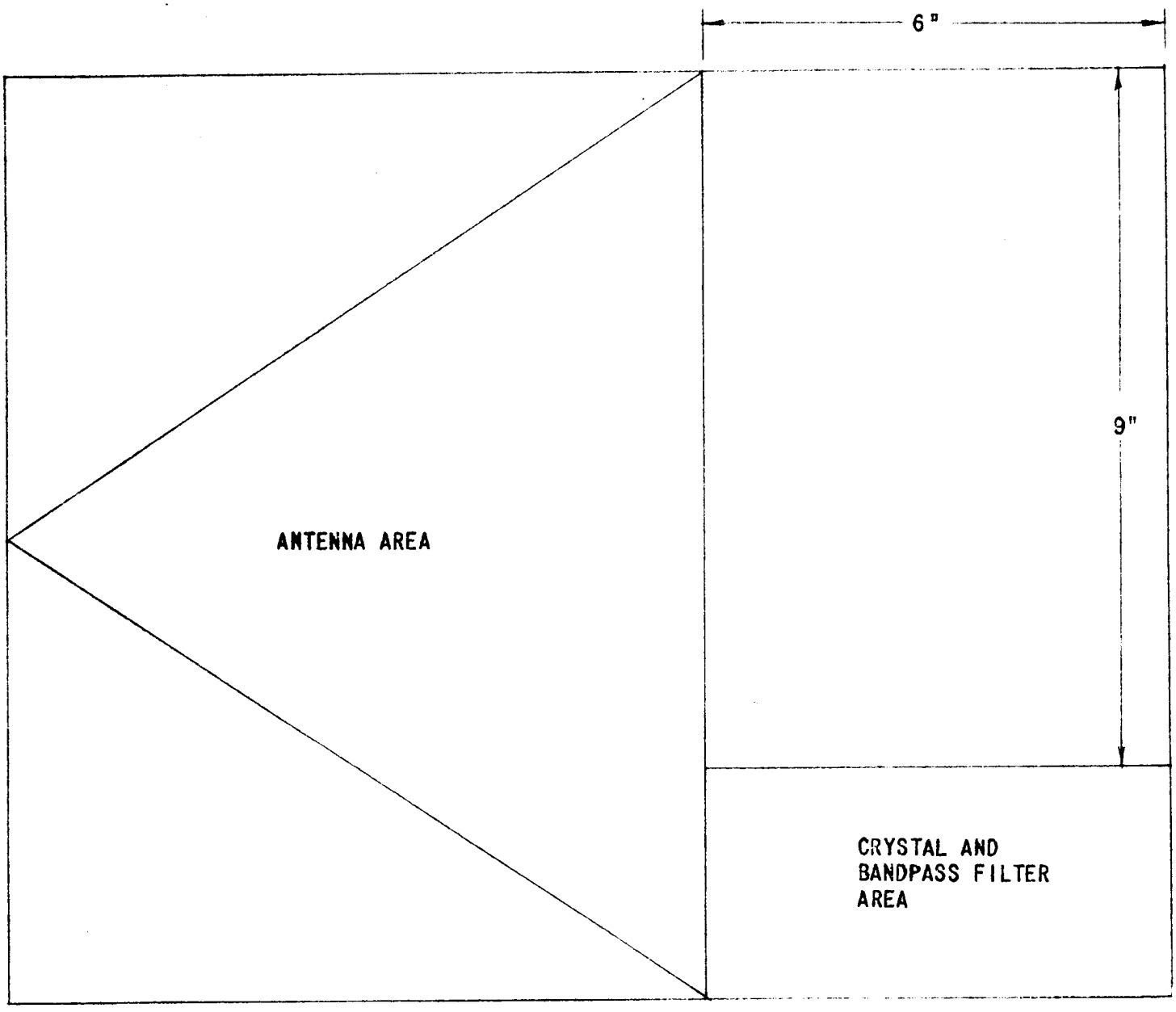

FIGURE 2

EQUIPMENT BOARD
1 KMC. TO 10 KMC.

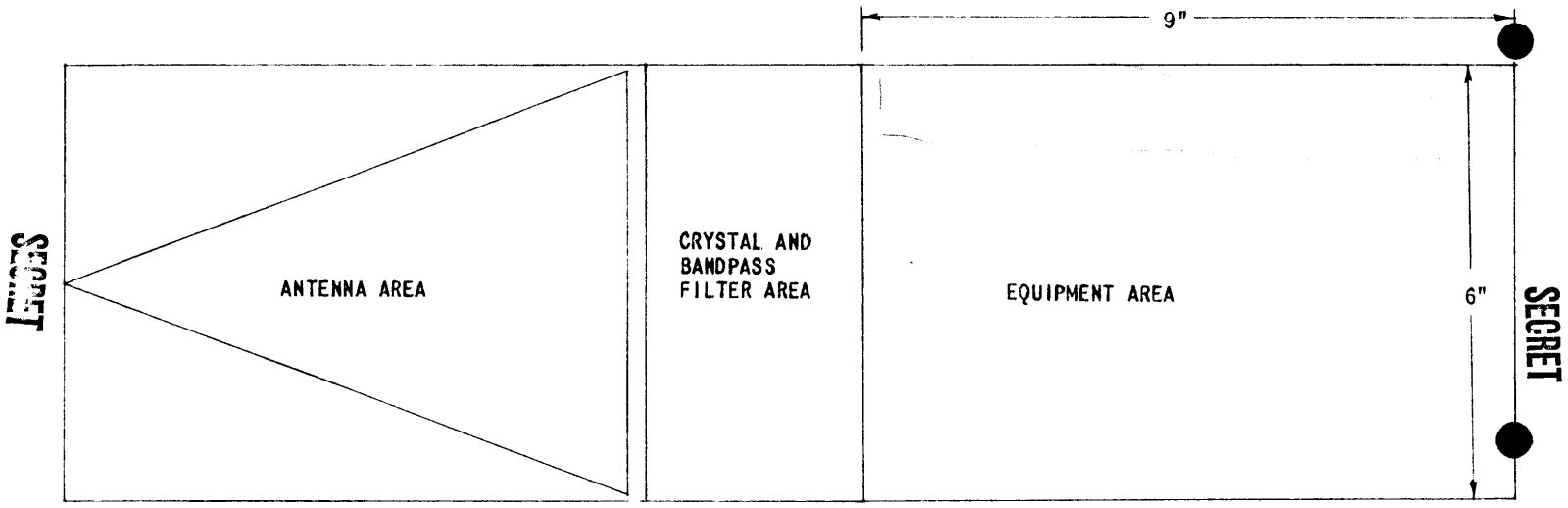

FIGURE 3

EQUIPMENT BOARD
10 KMC. TO 40 KMC.

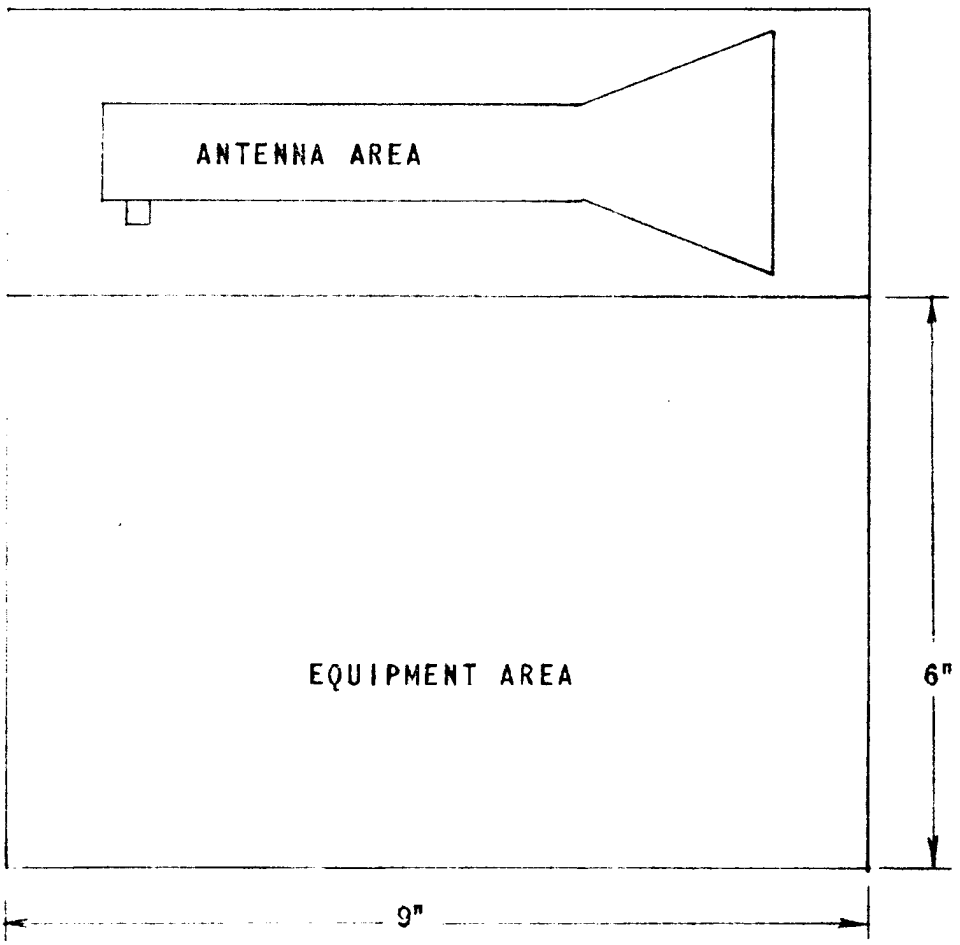

FIGURE 4

EQUIPMENT AREA
DETAIL DRAWING

CONFIDENTIAL

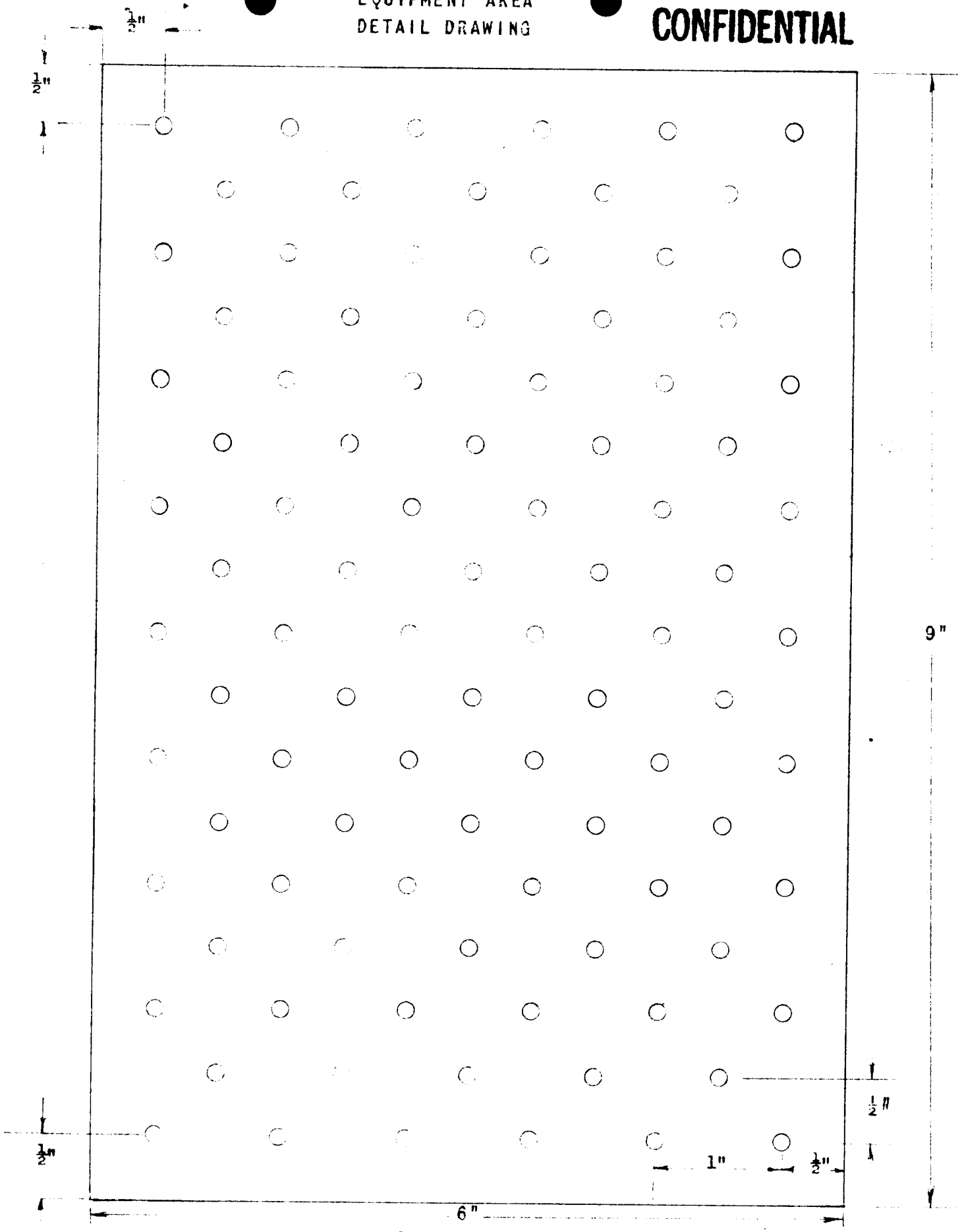

FIGURE 5

CONFIDENTIAL

ATTACHMENT "B"

TO

SPECIFICATION 59-A-1088-A

1. Reference Paragraph 3.3 Filter Characteristics.

Paragraph 3.3.2 Electrical Considerations

This paragraph shall be amended to read as follows:

One each of the following band-pass filters shall be required for each complete system as defined in Section 1.2 of these specifications:

50 to 100 mc	2,000	to	4,000 mc
100 to 200 mc	4,000	to	8,000 mc
200 to 500 mc	8,000	to	10,000 mc
500 to 750 mc	10,000	to	40,000 mc
750 to 1000 mc	20,000	to	40,000 mc
1000 to 2000 mc	30,000	to	40,000 mc

In the event that the frequency range of 50 to 500 mc cannot be covered with the filters specified, the following coverages shall be used in their place:

50	to	100 mc
100	to	200 mc
200	to	400 mc
250	to	500 mc

All other filters covering the range of 500 to 40,000 mc shall remain as specified in this section.

2. Reference Paragraph 3.3.2.1

This paragraph shall be amended to read as follows:

Attenuation in the pass-band of the filters shall not exceed 2 db. Skirt selectivity shall provide at least 45 db attenuation at all frequencies ±15% or more from the pass-band edges. A figure of 60 db attenuation at all frequencies ±15% from the pass-band edges is established as a design goal.

3. Reference Paragraph 3.4 Detector Characteristics

This paragraph shall be amended to read as follows:

The detectors shall be of a type such that a sensitivity of not less than -47 dbm shall be obtained from 50 to 10,000 mcs. A sensitivity of not less than -45 dbm shall be obtained from 10 to 20 kmc, and a sensitivity of not less than -40 dbm shall be obtained from 20 to 40 kmc.